The Gender Game

How digital gamified approaches can enhance deconstruction of gender stereotypes in Science

Marie Gallais†
IT for Innovative Services
Luxembourg Institute of Science and Technology (LIST)
Esch/Alzette, Luxembourg
marie.gallais@list.lu

Dimitra Anastasiou†
IT for Innovative Services
Luxembourg Institute of Science and Technology (LIST)
Esch/Alzette, Luxembourg
dimitra.anastasiou@list.lu

Carole Blond-Hanten†
Labour Market Department
Luxembourg Institute of Socio-Economic Research (LISER),
Esch/Alzette, Luxembourg
carole.blond-hanten@liser.lu

ABSTRACT
With the overall goal to promoting science to a wide audience, a team of researchers created a board game, named the Gender Game (GG), with a dual perspective: raising awareness on gender equality, specifically gender stereotypes on one hand, and on the other hand, sparking the public's scientific curiosity. Currently the game is being digitally develop. This contribution presents the GG and its impact measure protocol regarding enhancement of playing experience and learning of participants.

CCS CONCEPTS
• Social and professional topics • User characteristics • Gender; • Human-Centered computing • Collaborative and social computing

KEYWORDS
Game, digital game-based learning, playing experience, gender stereotypes in science

1 Introduction
Females are underrepresented in STEM (Science, Technology, Engineering, and Mathematics) disciplines and many educational inequities in STEM are rooted in stereotypes (Master, 2021). To achieve gender equality, awareness must begin at an early age so that stereotypes fade, and democratic patterns of behaviour can grow (King and al, 2021). Awareness is thus essential, and it is important to provide educational tools and activities to improve the point of view related to gender equality and thus engage debate in early childhood period (Karabay and al, 2019).

The objective of the Gender Game (GG) is to deconstruct gender stereotypes by highlighting a scientific approach. It is rooted in the social sciences and aims to outreach the public about the specific issue of gender equality by presenting scientific results. The core of the GG is the physical play, but currently it is being digitally develop. Digital elements will revamp the game into a scientifically validated physical-digital tool. The digital enhanced GG aims thus at facilitating the animation of the game, boosting the interaction between the animators and the audience, and between the players, and enhancing students’ engagement and learning (Khan & al., 2017), and their playing experience. To achieve these goals, the GG is linked to game-evaluation battery: immediate impact (3), situational impact (4) and analysis of gestures and attitudes (5). After presenting the GG (2), we will explain this impact measures protocol (3-6).

2 What is the GG?
Originally the "GG" is a giant board game (3X3m) constructed like a puzzle made up of 16 pieces. The GG operates in a question-and-answer mode and is played with 4 teams of 2 to 5 players each. The game’s questions come from four areas, the first three (work, knowledge, and power) are also analyzed by the European Institute for Gender Equality (EIGE), while the fourth domain (society) allows communication about societal and cultural facts, mainly from Luxembourg. There are 144 cards corresponding to a total of 144 questions and answers prepared in advance, with 12 questions per area for each age group. The questions are available in 4 languages (French, Luxembourgish, German, and English). The figure 1 provides an example of GG’s question.

---

1 The Gender Game project is coordinated by Luxembourg Institute of Socio-Economic Research (LISER) in partnership with Luxembourg Institute of Science & Technology (LIST).
2 https://www.gender-game.lu/
3 https://eige.europa.eu/
The questions’ cards used in each session depend on the players’ age. The GG is suitable for children aged 8 and above, as well as for young people and adults. It also lends itself to intergenerational play – simply draw questions from the appropriate set when it’s the children’s, youth’s, or adult’s team’s turn. In general, 15 to 20 people, divided into four teams, can play GG in a session. The four teams are represented by four pawns in the form of gender-neutral animals (cat, dog, fox, hedgehog). The duration of one game session is approximately one hour and half. The figure 2 provides pictures of what is the GG.

Figure 2 – GG game board, pawns, and questions areas

3 The immediate impact measure
The first impact measure monitors the immediate impact of the game according to a “before-and-after-design” questionnaire methodology (Sedgwick, 2014) (a), in game observations (b) and game experience evaluation (c).
(a) Questionnaires are administered to players before and after the game, thanks to tablets. Thematically, the questionnaire focuses on science and stereotypes. It is composed of closed questions (e.g., “Create a person who does research! Pick all the elements you need!”) and open questions (e.g., “What do you think a researcher does?”) giving rise to quantitative and qualitative exploitation. It also includes a section collecting socio-demographic data and a section on the appreciation of the game.
(b) Researchers use a grid to mark their in-game observations. The grid is based on Bloom’s taxonomy (Gogus, 2012) (e.g., comprehension, use and application of knowledge) and the Kirkpatrick model (e.g., elements of un/satisfaction regarding the activity).
(c) After each GG session, researchers ask participants to fill in the “Player Experience Inventory” (PXI) questionnaire. It allows to measure player experience at both levels: Functional (i.e., the immediate experiences as a direct result of game design choices, such as audiovisual appeal) and Psychosocial (i.e., emotional experiences, such as immersion) consequences. It provides thus actionable insight, to better understand how game design choices impact the player actions during the runtime of the game, and how they shape emotional responses (Vanden Abeele, 2020).

4 The situational impact measure
It is highly important to measure public judgement “in situation”. A voting system device is integrated into the tablets. Researchers select a few questions from the GG and when players come across one of these questions during the game, the voting system is activated. Once the “agree/disagree” responses are entered, the result is immediately displayed on the screen as a graph (for example: a certain % of boys agree with this statement as against a certain % of girls). This live projection is likely to provoke “in situation” reactions and stimulate exchanges around gender stereotypes and science.

5 The analysis of gestures and attitudes
We observe how non-verbal communication translates or emphasizes the opinions of players. We analyzed five sessions with >6h of video recordings with the goal of observing the speech-gesture interaction and the children’s social behavior. We based our observation on multimodal indicators analysis, including both verbal (speech) and non-verbal cues (hand gestures and gaze). We found out that gamification facilitates gender-related behaviors. Players feel at ease and speak their mind and thoughts freely, without any barriers. We confirm that gestures emphasize not only the wording, but also the emotions of the children when they speak about stereotypes. Concerning the types of gestured that were produced, we mainly identified ideographs (sketching a path while explaining a concept), but also iconic gestures (be quiet, showing an oval face), and emojis (winnings gestures) (Anastasiou et al., 2023).

6 Conclusion
The GG and its impact measure protocol is dedicated to deconstructing gender stereotypes but is also intended to be applied to other themes (racism, climate change) based on communicating science to the public.

ACKNOWLEDGMENTS
We acknowledge the participants of GG playing sessions. The GG is supported by the National Research Fund (FNR) in Luxembourg.

REFERENCES

With the informed consent of parents
4 https://www.valamis.com/hub/kirkpatrick-model
5 https://playerexperiencinventory.org/assets/docs/PXI_ Questionnaire.pdf